

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
26 May 2005 (26.05.2005)

PCT

(10) International Publication Number
WO 2005/046722 A3

(51) International Patent Classification⁷: **A61K 39/385**,
47/48, 31/70

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(21) International Application Number:
PCT/US2004/035831

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(22) International Filing Date: 27 October 2004 (27.10.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PCT/US2003/034897

5 November 2003 (05.11.2003) US
60/554,994 22 March 2004 (22.03.2004) US

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(84) Designated States (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

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(88) Date of publication of the international search report:
21 July 2005

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

(54) Title: CARBOHYDRATE ANTIGEN-NANOPARTICLE CONJUGATES AND USES THEREOF AS ANTIMETASTATIC AGENTS IN TREATING CANCER

(57) Abstract: Carbohydrate antigen-nanoparticle conjugates are disclosed. Methods of making carbohydrate antigen-nanoparticle conjugates are also disclosed. The carbohydrate antigen-nanoparticle conjugates can be used to inhibit metastasis of tumor cells in mammals.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K39/385 A61K47/48 A61K31/70

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, BIOSIS, EMBASE, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/32404 A (CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS; KIDDLE, SIMON, JOHN;) 25 April 2002 (2002-04-25) page 1, line 4 - line 10 page 3, line 22 - page 14, line 28 figure 1 claims 1-4, 11, 15, 26, 27	1-13, 15, 18-50, 54-76
Y		14, 16, 17, 51-53, 77-79
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

12 May 2005

Date of mailing of the international search report

06/06/2005

Name and mailing address of the ISA

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Ulbrecht, M

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/035831

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>BARCHI JOSEPH J JR ET AL: "Synthesis and properties of carbohydrate- and glycopeptide-bearing nanoparticles." ABSTRACTS OF PAPERS AMERICAN CHEMICAL SOCIETY, vol. 226, no. 1-2, 2003, page CARB 40, XP009047320 & 226TH ACS (AMERICAN CHEMICAL SOCIETY) NATIONAL MEETING; NEW YORK, NY, USA; SEPTEMBER 07-11, 2003 ISSN: 0065-7727 abstract</p>	<p>1-13,15, 18-50, 54-76</p>
Y		<p>14,16, 17, 51-53, 77-79</p>
Y	<p>----- HAKOMORI S: "ABERRANT GLYCOSYLATION IN TUMORS AND TUMOR-ASSOCIATED CARBOHYDRATE ANTIGENS" ADVANCES IN CANCER RESEARCH, ACADEMIC PRESS, LONDON, GB, vol. 52, 1989, pages 257-331, XP002905215 ISSN: 0065-230X the whole document</p>	<p>14,16, 17, 51-53, 77-79</p>
Y	<p>----- GLINSKY VLADISLAV V ET AL: "Intravascular metastatic cancer cell homotypic aggregation at the sites of primary attachment to the endothelium." CANCER RESEARCH, vol. 63, no. 13, 1 July 2003 (2003-07-01), pages 3805-3811, XP002327998 ISSN: 0008-5472 cited in the application abstract</p>	<p>14,16, 17, 51-53, 77-79</p>
Y	<p>----- GLINSKY VLADISLAV V ET AL: "The role of Thomsen-Friedenreich antigen in adhesion of human breast and prostate cancer cells to the endothelium" CANCER RESEARCH, vol. 61, no. 12, 15 June 2001 (2001-06-15), pages 4851-4857, XP002327999 ISSN: 0008-5472 abstract</p> <p>----- -/--</p>	<p>14,16, 17, 51-53, 77-79</p>

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/035831

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KHALDOYANIDI SOPHIA K ET AL: "MDA-MB-435 human breast carcinoma cell homo- and heterotypic adhesion under flow conditions is mediated in part by Thomsen-Friedenreich antigen-galectin-3 interactions." JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 278, no. 6, 7 February 2003 (2003-02-07), pages 4127-4134, XP002328000 ISSN: 0021-9258 abstract	14,16, 17, 51-53, 77-79
Y	----- RAGUPATHI GOVINDASWAMI ET AL: "Vaccines prepared with sialyl-Tn and sialyl-Tn trimers using the 4-(4-maleimidomethyl)cyclohexane-1-carboxy 1 hydrazide linker group result in optimal antibody titers against ovine submaxillary mucin and sialyl-Tn-positive tumor cells" CANCER IMMUNOLOGY IMMUNOTHERAPY, vol. 48, no. 1, April 1999 (1999-04), pages 1-8, XP002328001 ISSN: 0340-7004 abstract	14,51, 77-79
Y	----- LLOYD K O: "Carbohydrate vaccines for the immunotherapy of cancer" DRUG NEWS AND PERSPECTIVES 2000 SPAIN, vol. 13, no. 8, 2000, pages 463-470, XP001206504 ISSN: 0214-0934 abstract figure 2	14,16, 17, 51-53, 77-79
T	----- SVAROVSKY S A ET AL: "Synthesis of gold nanoparticles bearing the Thomsen-Friedenreich disaccharide: a new multivalent presentation of an important tumor antigen" TETRAHEDRON: ASYMMETRY, PERGAMON, OXFORD, GB, vol. 16, no. 2, 24 January 2005 (2005-01-24), pages 587-598, XP004743805 ISSN: 0957-4166 the whole document	1-79

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Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 42-76, 79
because they relate to subject matter not required to be searched by this Authority, namely:

Although claims 42-76 and 79 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/035831

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0232404	A	25-04-2002	AU 9406801 A	29-04-2002
			CA 2424734 A1	25-04-2002
			EP 1326589 A2	16-07-2003
			WO 0232404 A2	25-04-2002
			JP 2004511511 T	15-04-2004
			US 2004052729 A1	18-03-2004
